

## E.5 INTERDISCIPLINARY SCIENCE FOR ECLIPSE 2017

**NOTICE: Step-1 proposals are due October 27, 2016. Step-2 proposals are due November 30, 2016.**

**Proposals to this program will be taken by a two-step process in which the Notice of Intent is replaced by a required Step-1 proposal submitted by an organization Authorized Organizational Representative. No PDF upload is required or permitted for the Step-1 proposal. Step-1 proposers merely must fill in the Proposal Summary text box on the NSPIRES cover pages. Only proposers who submit a Step-1 proposal are eligible to submit a Step-2 (full) proposal. See Section 3 for details. The standard rules for Appendix B, as laid out in program element B.1 apply, to this program element. Data management plans will be collected as part of the NSPIRES cover pages.**

### 1. Scope of the Program

#### 1.1 Overview

A total solar eclipse is widely regarded as one of the most incredible natural phenomenon visible from Earth. On August 21, 2017, a total solar eclipse will traverse the continental U.S. from Oregon to South Carolina. For approximately 90 minutes, city after city along the centerline will experience two to nearly three minutes of darkness during daytime as totality moves from west to east. While the path of totality will cover a swath only 60 miles wide, the contiguous U.S. States will see at least 65% of the Sun disappear behind the Moon during its progression of phases. It is estimated that a large fraction of the population in North America will witness this natural event (<http://eclipse2017.nasa.gov/>).

The purpose of this program element is to support development of new research or enhancement of existing research, applied to the 2017 eclipse. NASA is seeking proposals that would utilize the unique opportunity presented by the solar eclipse to study the Sun, Earth, Moon, astronomy, and/or space science, including the ionosphere-thermosphere-mesosphere (ITM) system. Building on existing partnerships and the use of interdisciplinary or citizen science approaches is encouraged. All proposals must demonstrate links to the 2017 solar eclipse.

This initiative complements NASA's capabilities of observing the Sun and the Sun-Earth-Moon system globally from space thereby supporting NASA's mission to "drive advances in science, technology, aeronautics, space exploration, economic vitality, and stewardship of the Earth." More specifically it supports Objective 1.4 from the [NASA Strategic Plan](#) to "understand the Sun and its interactions with Earth and the solar system, including space weather" by advancing the use of traditional science and citizen science approaches in scientific research during the total solar eclipse of 2017. It does so by directly supporting scientific research and development and deployment of existing and/or new technology.

#### 1.2. Scientific Focus

The Interdisciplinary Science for Eclipse (ISE) initiative is using this program element to take advantage of the coast-to-coast eclipse over a period of approximately 90 minutes to promote

sensor (space and ground) and camera development and deployment, as well as traditional science, citizen science, and crowdsourcing platforms or techniques, applied to the study of the Sun, Earth, Moon, astronomy, and/or space science, which includes ionosphere-thermosphere-mesosphere (ITM) system.

While solar eclipses are perhaps best known for their stunning visual beauty and detailed structure of the innermost corona, the shadow of the eclipse can also cause changes in the geospace environment and Earth's atmosphere. This long duration circumstance might provide opportunities to study responses in the Earth's atmosphere, particularly the ionosphere-thermosphere-mesosphere (ITM) system, to a known change in incoming solar radiation.

Regardless of the scientific focus, the type of proposals, or sources of data, proposals may aim to address eclipse science at the local, regional, continental, or global scales. These approaches could complement NASA spacecraft observations by providing increased temporal or spatial sampling, or contribute to the validation of NASA data products derived from spacecraft observations, or deploy innovative sensors, or use other innovative ways and/or a combination of the above to enhance the utility of NASA's observation systems from space, air, and land during this unique opportunity.

## 2. Types of Proposals for Interdisciplinary Science for Eclipse

An important goal of the ISE initiative is to promote ground- and space-based observations related to the study of the solar eclipse. This initiative is especially interested in receiving interdisciplinary proposals. Preference is given to proposals that include both collection of data and application of these data to utilize the solar eclipse for the study of the Sun, Earth, Moon, space science, and astronomy. Proposals should not simply explain how the measurement could be used, but should actually include tasks that use the resulting data to, for example, improve models, guide observations, or other relevant tasks. This broad goal can be achieved using "traditional" science and/or citizen science approaches.

For the purpose of this program element, "citizen science approaches" is defined as efforts or projects which use voluntary public participation in the scientific endeavor, including – but not limited to – formulating research questions, conducting experiments, collecting and analyzing data collected by citizen and/or professional scientists, interpreting results, making new discoveries, and/or developing new/existing technologies and applications. Crowdsourcing, another frequently used term describing voluntary contributions, is included under citizen science in this program element. (See the Federal Crowdsourcing and Citizen Science Toolkit for further explanations and guidance: <https://crowdsourcing-toolkit.sites.usa.gov/>). Citizen science is distinguished from public outreach in that the primary purpose of involving the public is to make contributions to science.

Possible areas of interest include, but are not limited to:

- Design and manufacture of hardware to contribute to and enhance the science of the inner corona during the total solar eclipse;
- Ionospheric thermospheric, and mesospheric investigations using the eclipse as a point response function and observing with GPS receiver networks;

- Viewing eclipse-induced changes in the upper atmosphere using space-based assets;
- Viewing atmospheric response under the shadow of the Moon with earth science assets;
- Understanding atmospheric responses (chemical, dynamic, systematic) by observing Earth from other satellite systems (e.g., [DSCOVR](#), [ISS](#), Cubesats);
- Coordination with network of high-altitude balloons to observe the eclipse from the stratosphere.

### 3. Proposal Preparation, Submission, and Evaluation

To be relevant, proposals must demonstrate how the proposed investigation would use traditional science and/or citizen science approaches in scientific research to utilize the solar eclipse to study the Sun, Earth, Moon, astronomy and/or space science, which includes the ionosphere-thermosphere-mesosphere (ITM) system, as described in Section 2.

All proposals must demonstrate how the proposed investigation would fully achieve the specific objectives and goals proposed. A goal is understood to have a broad scope while an objective is understood as a more narrowly focused part of a strategy to achieve a goal. Proposed investigations must achieve their proposed objectives; however, the investigation might only make progress toward a goal without fully achieving it.

#### 3.1 Two-Step Submission Guidelines

To streamline the proposal process (submission, evaluation, and administration), this program uses a two-step proposal submission process. The overall description of a two-step process can be found in Section IV, (b) vii of the *ROSES-2016 Summary of Solicitation*.

A Step-1 proposal is required and must be submitted electronically by the Step-1 due date (see below and Tables 2 and 3 in the *ROSES-2016 Summary of Solicitation*). The Step-1 proposal must be submitted by the organization Authorized Organizational Representative (AOR). No budget or other elements are required. Only proposers who submit a Step-1 proposal are eligible to submit a full proposal. Step-1 proposals will be checked for compliance, but they will not be evaluated. The Step-1 proposal title, science goals, and investigators (Principal Investigator (PI), Co- Investigators (Co-Is), Collaborators, Consultants, and Other Professionals) cannot be changed between the Step-1 and Step-2 proposals. The expected format and evaluation criteria are described below. Submission of the Step-1 proposal does not obligate the offerors to submit a Step-2 (full) proposal later.

##### 3.1.1 *Step-1 Proposal Content*

Proposers should refer to the "Instructions for Submitting a Step-1 Proposal" under "Other Documents" on the NSPIRES page for this program. The Step-1 proposal is restricted to the 4000-character Proposal Summary (i.e., abstract) text box on the NSPIRES web interface cover pages. References and any other supporting material are not required, but, if included, must fit within the limit. The proposal summary is entered directly into a text field in NSPIRES. No PDF attachment is permitted for Step-1 proposal submission. The Step-1 proposal must include the following information:

- The science goals and objectives to be addressed by the proposal;
- A listing of the data to be used in the investigation;

- A listing of the data analysis methodology and any models or simulations to be used.
- A brief statement of the relevance of the problem to the goals of connecting the eclipse to the study of the Sun, Earth and Moon, astronomy and/or space science which includes the ionosphere-thermosphere-mesosphere (ITM) system.

Proposers will be notified by NSPIRES when they are able to submit their Step-2 proposals.

### 3.1.2 Step-2 Proposals

A Step-2 (full) proposal must be submitted electronically by the Step-2 due date (see below and Tables 2 and 3 in the *ROSES-2016 Summary of Solicitation*). The Step-2 proposal must be submitted via NSPIRES or Grants.gov by the organization Authorized Organizational Representative (AOR). A budget and other specified information is required. The Step-2 proposal title, science goals, and investigators (Principal Investigator, Co-Investigators, Collaborators, Consultants, and Other Professionals) must be the same as those in the Step-1 proposal.

Proposers must have submitted a Step-1 proposal to be eligible to submit a Step-2 proposal. Proposers that received a noncompliant letter are not eligible to submit a Step-2 proposal.

### 3.1.3 Step-2 Proposal Format

The process for preparation and submission of the Step-2 (full) proposals is the same for any other ROSES proposal. Guidelines for content and formatting full proposals are specified in the *NASA Guidebook for Proposers* and the *ROSES-2016 Summary of Solicitation*.

Proposals are restricted to ten (10) pages for the Scientific/Technical/Management section and must include the following sections with the preferred order:

- The science objectives and perceived impact of the proposed work to the state of knowledge in the field; references to existing work in the field should be limited to that which is needed to justify the value of the science proposed;
- The data and methodology to be employed in conducting the proposed research; the proposal must demonstrate (1) that the data are appropriate to address the science objectives and (2) that the methodology is both appropriate and feasible to make substantial progress on the science objectives;
- The relevance of the proposed work to the goals of connecting the eclipse to the study of the Sun, Earth and Moon; space science; and astronomy.
- A general plan of work, the management structure for the proposal personnel, and a description of the expected contribution to the proposed effort by the PI and each person identified in the proposal whether or not they derive support from the proposed budget. Postdoctorals and students do not need to be identified by name.

All proposals submitted to ROSES must strictly conform to the formatting rules. Proposals that violate the rules may be rejected without review or declined following review if violations are detected during the evaluation process.

- The Scientific/Technical/Management section must not exceed the length specified in this Program Element.

- Margins: no less than 1 inch on all sides, with a page size of 8.5 × 11 inches.
- Font: Times New Roman, 12-point or larger. If an alternate font is used, it must meet the requirement of having, on average, no more than 15 characters per inch. Proposers may not adjust the character spacing or otherwise condense a font from its default appearance.
- Line spacing: Font and line spacing settings must produce text that contains, on average, no more than 5.5 lines per inch. Proposers may not adjust line spacing settings for a selected font below single spaced.
- Figure captions: Captions must follow the same font and spacing rules as the main text.
- Figures and tables: For text in figures and tables, font and spacing rules listed above do not apply, but all text must be judged to be legible to reviewers without magnification above 100%. Expository text necessary for the proposal may not be located solely in figures or tables, or their captions.

Guidelines for submitting Step-2 full proposals, other than those listed above, are specified in the *NASA Guidebook for Proposers*. Where they conflict, the guidelines above supersede those found in the Guidebook.

### 3.2 Step-2 Evaluation Criteria

Step-2 proposals that are not compliant with format requirements may be rejected without review. See Section IV (b) (ii) of the *ROSES-2016 Summary of Solicitation* and the *NASA Guidebook for Proposers* for details.

Compliant proposals will be evaluated according to the criteria specified in Section C.2 of the *NASA Guidebook for Proposers*. These criteria are intrinsic scientific and technical merit, relevance, and cost realism/reasonableness.

The evaluation of scientific and technical merit will include:

- Compelling nature and scientific priority of the proposed investigation's science goals and objectives, including the importance of the problem, the unique value of the investigation to make scientific progress, and the importance of carrying out the investigation now.
- Appropriateness and feasibility of the methodology, including the appropriateness of the selected data, models, and analysis for completing the investigation and the feasibility of the methodology for ensuring scientific success.
- Technology development proposals need to demonstrate that they can achieve their goals within the schedule and budget of the award.

Based on the science and technical factors, the evaluation will consider the overall potential science impact and probability of success of the investigation.

Cost realism/reasonableness includes assessing the amount of work to be accomplished versus the amount of time proposed. Open-ended proposals or those with a large number of science questions to be addressed typically do not fare well in this evaluation. Only necessary Co-Investigators and Collaborators should be included, and their specific tasks and roles in the investigation must be clearly laid out in the proposal work plan.

Moreover, proposals that are interdisciplinary (i.e., including work outside of that normally funded by the Heliophysics Division) may be contingent on funds from the other Science Mission Directorate Divisions.

#### 4. Summary of Key Information

Expected annual program budget for new awards	~ \$0.8 M (Heliophysics contribution)
Number of new awards pending adequate proposals of merit	Investigations including instrument deployment: ~4 (~\$100k/award); Other research awards: ~8 (~\$50k/award)
Maximum duration of awards	1 year
Due date for Step-1 proposal	<b>October 27, 2016</b>
Due date for Step-2 proposal	<b>November 30, 2016</b>
Date for start of investigation	No earlier than January 1, 2017.
Page limit for the central Science-Technical-Management section of proposal	10 pp; see also Chapter 2 of the <i>NASA Guidebook for Proposers</i>
File size limit for the proposal	20MB
Relevance	This program is relevant to the Science goals of the Heliophysics, Planetary, Astrophysics, and Earth Science divisions stated in the NASA Science Plan. Proposals that are relevant to this program are, by definition, relevant to NASA.
General information and overview of this solicitation	See the <i>ROSES-2016 Summary of Solicitation</i> .
Detailed instructions for the preparation and submission of proposals	See the <i>NASA Guidebook for Proposers</i> at <a href="http://www.hq.nasa.gov/office/procurement/nraguidebook/">http://www.hq.nasa.gov/office/procurement/nraguidebook/</a> .
Submission medium	Electronic proposal submission is required; no hard copy is required or permitted. See also Section IV of the <i>ROSES-2016 Summary of Solicitation</i> and Section 3.3 of the <i>NASA Guidebook for Proposers</i> .
Web site for submission of proposals via NSPIRES	<a href="http://nspires.nasaprs.com/">http://nspires.nasaprs.com/</a> (help desk available at <a href="mailto:nspires-help@nasaprs.com">nspires-help@nasaprs.com</a> or (202) 479-9376)
Web site for submission of proposals via Grants.gov	<a href="http://grants.gov">http://grants.gov</a> (help desk available at <a href="mailto:support@grants.gov">support@grants.gov</a> or (800) 518-4726)
Funding opportunity number for downloading an application package from Grants.gov	NNH16ZDA001N-ISE

NASA points of contact concerning this program	Madhulika Guhathakurta Heliophysics Division Science Mission Directorate National Aeronautics and Space Administration Washington, DC 20546-0001 Telephone: (202) 358-1992 E-mail: <a href="mailto:madhulika.guhathakurta@nasa.gov">madhulika.guhathakurta@nasa.gov</a>
--	---

---